a6 cancel and the center part of each of the rotor or stator teeth under the coils has a rounded, oval, or circular profile, whereby to reduce the risk of destruction of the insulation by a sharp bending of the winding coils, and to maximize the copper filling factor.

REMARKS

This application has been reviewed in light of the Office Action dated April 24, 2002. Claims 1-4 and 15-28 are pending in this application.

The Office Action objected to the drawings based on 37 CFR 1.83(a). The objection required that the stator teeth and coils, the round profile, the oval profile, and the circular profile must be shown or the features canceled from the claims.

Applicants have carefully reviewed and amended the specification to overcome the noted objection. Submitted herewith is a Request for the Approval of Drawing Changes. Support for proposed Figure 23 (showing rounded, circular, and oval profiles) may be found, for example, on page 38, line 11 of the originally-filed specification as well as in originally-filed Claim 16. Support for proposed Figure 24 (showing stator teeth and coils) may be found, for example, in originally filed Claims 3 and 8. As such, no new matter is being entered. It is believed that the objection to the drawings has been remedied, and its withdrawal is therefore respectfully requested.

In addition to the foregoing, Applicants have made certain additional changes to Figures 2-22 to correct certain informalities, as set forth in the accompanying Request for Approval of Drawing Changes. Entry of these changes is respectfully requested.

Claims 1-4 and 15-28 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite.

The claims have been carefully reviewed and amended as deemed necessary to ensure that they conform fully to the requirements of Section 112, second paragraph, with special attention to the points raised in paragraph 5 of the Office Action. Specifically, Claims 1, 4, 15, and 16 have been amended to provide antecedent basis for the claim limitations "the terminals", "the magnetic circuit", and "the stator teeth". It is believed that the rejection under Section 112, second paragraph, has been obviated, and its withdrawal is therefore respectfully requested.

Claims 1, 3, and 4 were rejected under 35 U.S.C. § 102(b) as being anticipated by Klein (U.S. 4,329,610). Claims 2, 15, and 21 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Klein in view of Ward (U.S. 5,121,021). Claims 16 and 22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Klein and Ward, in further view of Wong et al. (Wong) (U.S. 5,304,885). Claims 17-19 and 23-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Klein and Ward, in further view of Case et al. (Case) (U.S. 3,095,515). Claims 20 and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Klein and Ward, in further view of Katagiri (U.S. 5,949,172). Claims 27 and 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Klein, in further view of Tanaka, et al. (U.S. 6,057,626).

Claim 1 is directed to a direct current motor that comprises a stator with 2P poles. This direct current motor also comprises a rotor core, which includes a core of ferromagnetic material having S slots and S teeth. This ferromagnetic core is separated from the stator core by an airgap. The direct current motor also comprises a commutator,

which has a number of segments greater than the number of rotor slots S. The direct current motor also comprises a concentrated winding rotor. This concentrated winding rotor has a plurality of simple coils of insulated wire mounted on the same rotor tooth. The terminals of each of these coils is connected to different segments of the commutator.

Klein relates to an armature winding pattern for an electric motor. The armature winding pattern shown allows the first and second coil sub-sections of an armature coil undergoing commutation at one of the brushes to be coupled to the coil sub-section of an armature coil about to undergo commutation by the other brush. Klein shows that this is achieved by using lap and wave winding distributions (See Klein at column 1, line 20; Figure 2a; Figure 2b). Klein's windings are lap windings which are wound in an overlapping manner in the gaps between the teeth, as shown in figures 1, 2A, and 2B. Klein does not disclose a concentrated winding rotor, having a plurality of simple coils of insulated wire mounted on the same rotor tooth, as recited in Claim 1. Moreover, applicants submit that Klein does not suggest a concentrated winding rotor, having a plurality of simple coils of insulated wire mounted on the same rotor tooth. For at least this reason, it is believed that Claim 1 is patentable over Klein.

Independent Claim 4 recites features similar to those discussed above with respect to Claim 1 and therefore is also believed to be patentable over Klein for the reasons discussed above.

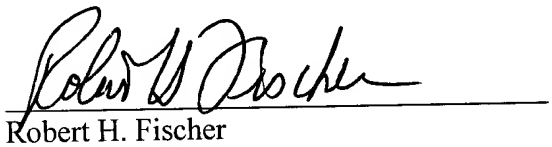
A review of the other art of record, including Ward, Wong, Case, Katagiri, and Tanaka, has failed to reveal anything which, in Applicants' opinion, would remedy the deficiencies of Klein, as references against independent Claims 1 and 4. Those claims are therefore believed patentable over the art of record.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1. A direct current motor comprising:

a stator with 2P poles;

a rotor core, including a core of ferromagnetic material having S slots and S teeth separated from the stator core by an airgap;

a commutator with a number of segments greater than the number of rotor slots S;

a concentrated winding rotor, having a plurality of simple coils of insulated wire mounted on the same rotor tooth, with a [the] terminal[s] of each of the [these] coils being connected to different segments of the commutator.

4. An AC commutator (Universal) motor comprising:

a stator with 2P poles, each pole comprising a coil wound around the tooth of a core of a ferromagnetic material;

a rotor core including a core of ferromagnetic material having S slots and S teeth separated from the stator core by an airgap, the stator and rotor core comprising a magnetic circuit;

a commutator with a number of segments Z bigger than the number of rotor slots S;

a concentrated winding rotor, having a plurality of simple coils of insulated wire mounted on the same rotor tooth, with a [the] terminal[s] of each of the [these] coils being connected to different segments of the commutator.

15. A direct current motor as claimed in claim 1 with [a] part of a [the] magnetic circuit realized with a soft magnetic composite made of metal powder.

16. A direct current motor as claimed in claim 15, wherein the stator comprises teeth and the center part of each of the rotor or stator teeth under the coils has [have] a rounded, oval, or circular profile, whereby to reduce the risk of destruction of the insulation by a sharp bending of the winding coils, and to maximize the copper filling factor.

VERSION WITH MARKINGS TO SHOW CHANGES MADE TO SPECIFICATION

The paragraph starting at page 20, line 21 has been amended as follows.

FIG 1 shows a cross-sectional view of an example of a direct current motor with a concentrated winding and permanent magnets in accordance with the present invention. Part 1 is the yoke of the stator. Part 2 is one of the stator poles, which are magnetized alternatively North and South, and which is made of a segment of permanent magnet. Part 3 is the tip of a rotor tooth. Part 4 is the center part of the rotor tooth under the coils. Part 5 is the yoke of the rotor. Part 6 is the concentrated winding, wound around a rotor [stator] tooth. Part 7 is one of the segments or bars of the commutator. Part 8 is one of the brushes in contact with the segments of the commutator and which is used to feed the supply current to the armature winding.

The paragraph starting at page 38, line 8 has been amended as follows.

When an isotropic soft magnetic material is used, it is also useful to make the cross-section profile of the center part of the rotor and stator teeth under the coils, rounded, oval, or circular to get a reduction of the risk of destruction of the insulation by a sharp bending of the winding coils, and to maximize the copper filling factor. Figure 23 shows an example of circular, rounded and oval cross-section profiles. Figure 24 shows an example of stator teeth 2400 and stator coils

2410. Figure 24 shows an example of stator teeth (2310, 2320 and 2330, respectively) of rotor tooth 2300.

The following paragraphs have been added to page 12 after line 25 and before page 13 line 1.

Figure 23 are rounded, oval, and circular cross-sectional profiles of rotor and stator teeth.

Figure 24 is a stator tooth wrapped with a stator coil.

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